

High Performance TRAC Boom for Solar Sails, Phase I

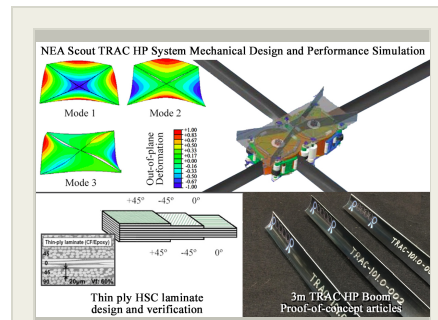
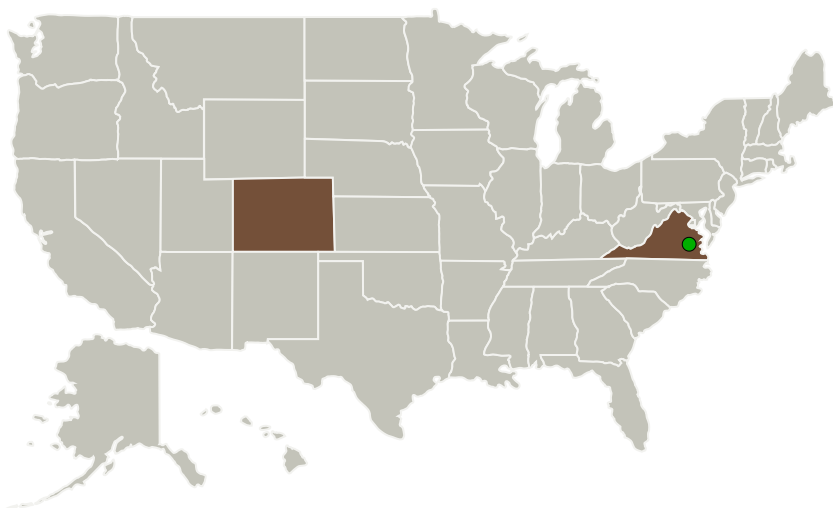
Completed Technology Project (2016 - 2016)



Project Introduction

In response to NASA's need for compact, low-cost deployable solar sail booms for CubeSats, Rocco proposes to develop a high performance composite TRAC (TRAC HP) Boom system. The proposed design will advance TRAC technology through: 1) the use of thin-ply composite laminates that are capable of higher packaging strains, 2) the use of high modulus carbon fibers to increase specific modulus of the deployed booms, and 3) incorporating a stepped taper of the boom laminate thickness along its length to improve compression efficiency while minimizing impact to packaged volume. Preliminary analyses indicate a composite TRAC HP boom can achieve more than a 3X increase in buckling strength and 15X reduction in thermal deformations compared to the Elgiloy TRAC design currently baselined for NASA's NEA Scout mission. The overarching Phase I objective is to conduct an preliminary design-analysis-fabrication-test loop for a TRAC HP four-boom system capable of meeting requirements for NASA's NEA Scout mission, and clearly identify engineering development risks that must be addressed to ultimately ensure adequate performance of these booms on-orbit. During Phase II, the TRAC HP Boom system will be developed to a proto-flight level of maturity (engineering design to flight CDR, and manufacturing/test plan in conformance with flight hardware quality standards), and numerous hardware prototypes will be built and tested to establish performance for NEA Scout and other CubeSat solar sail missions of interest to NASA.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Roccor, LLC	Lead Organization	Industry	Longmont, Colorado
● Langley Research Center (LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Colorado	Virginia
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Project Transitions

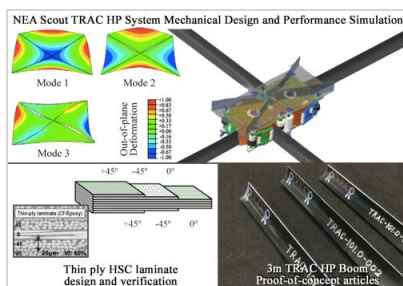
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

Closeout Documentation:

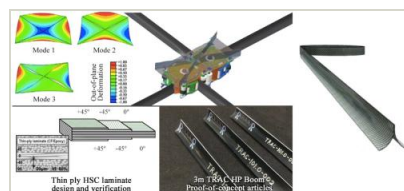
- Final Summary Chart (<https://techport.nasa.gov/file/139573>)

Images



Briefing Chart Image

High Performance TRAC Boom for Solar Sails, Phase I
(<https://techport.nasa.gov/image/134863>)



Final Summary Chart Image

High Performance TRAC Boom for Solar Sails, Phase I Project Image
(<https://techport.nasa.gov/image/130060>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Roccor, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

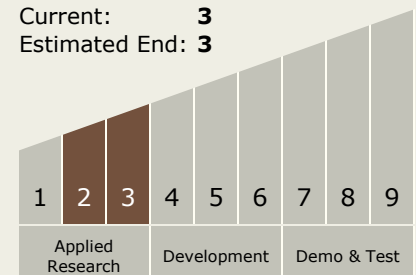
Carlos Torrez

Principal Investigator:

Thomas Murphey

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.1 Lightweight Concepts

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System